

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : CHUNITI SEIKO KK

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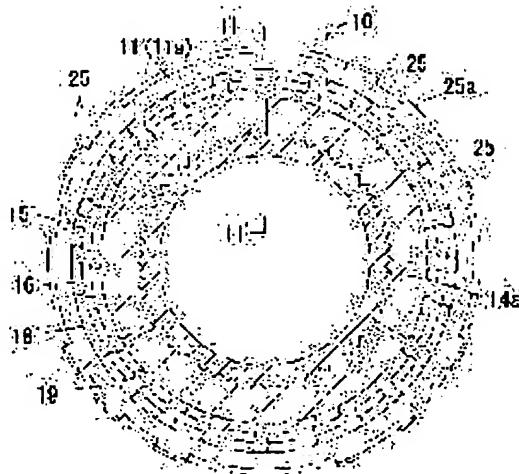
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(54) METHOD FOR MANUFACTURING FRICTION PLATE SUPPORTING RING FOR AUTOMATIC TRANSMISSION

(57)Abstract:

PROBLEM TO BE SOLVED: To solve such a problem that a supporting ring for supporting a friction plate composing an one-way clutch of an automatic transmission is not easily manufactured because the supporting ring has a hard inner surface necessary for the one-way clutch and complicated engaging projections on its outer surface for engaging with the friction plate so as to axially move, and further the supporting ring itself is to be machined after hardening by heat treatment.

SOLUTION: The above problem can be solved by manufacturing the supporting ring such that a circular ring shape blank is prepared and the outer surface of the blank is machined by a gear cutting method using a pinion cutter which has a pitch circle having a diameter equal to the pitch circle of the engaging projections to be formed on the outer surface of the blank and has such reversed undulations on the pitch circle that mate with the engaging projections to be arranged on the supporting ring.



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CLAIMS

[Claim(s)]

[Claim 1] The manufacture approach of the file plate support ring for automatic transmissions which carries out gear cutting and which prepares a circular ring-like material, has the pitch circle of the engagement projection in which the external surface of the material should be established outside, and the pitch circle of the diameter of said, and is formed on the pitch circle with the gear shaper cutter in which the engagement projection of the shaft orientations which should be prepared in a support ring, and the irregularity of the reverse form where it corresponds were formed.

[Claim 2] The manufacture approach of the file plate support ring for automatic transmissions which uses it in claim 1 as a material of said support ring which carried out the shape of a circular ring, carrying out RF selective quenching only of the inner skin, and hardening it although the temper was carried out by quenching and tempering.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Industrial Application] This invention relates to the manufacture approach for manufacturing what prepared said engagement projection in the hoop direction with the irregular pitch especially about the support ring which prepared the engagement projection in the periphery edge in order to hold the file plate of the automatic transmission for automobiles.

[0002]

[Description of the Prior Art] Generally, in the automatic transmission for automobiles, the engagement projection for holding a file plate is prepared in a periphery edge, and the support ring by which said engagement projection has been arranged in pitches [hoop direction] on the periphery edge is used commonly.

[0003] Since the cutter of a major diameter and a large-sized gear cutting machine are needed although gear cutting of the engagement projection can be carried out and it can also be manufactured with a gear shaper cutter in order to manufacture this support ring, the processing method for deleting the unnecessary section in accordance with shaft orientations is general with the plain milling cutter or the broaching machine conventionally about the peripheral face of the material which carried out annular. That is, between the engagement projections adjoined and formed by the plain milling cutter or the broaching machine is deleted using a milling cutter or a broach, and it is being begun to delete an engagement projection.

[0004]

[Problem(s) to be Solved by the Invention] However, when it was going to manufacture in recent years what has arranged the engagement projection formed in the peripheral face of a support ring to the irregular pitch by the conventional cutting approach, several sets of the machine tools furnished with several sorts of milling cutters or a broach with different width of face needed to be prepared. Therefore, it will be necessary to prepare many machine tools and also, the process for detaching and attaching a work piece increased, floor to floor time became long and there was fault which skyrockets processing cost remarkably.

[0005]

[Means for Solving the Problem] The above-mentioned technical problem prepares a circular ring-like material, has the pitch circle of the engagement projection in which the external surface of the material should be established outside, and the pitch circle of the diameter of said, and is solved by carrying out gear cutting and forming on the pitch circle, with the gear shaper cutter in which the engagement projection of the shaft orientations which should be prepared in a support ring, and the irregularity of the reverse form where it corresponds were formed. There, as a material of said support ring which carried out the shape of a circular ring, although the temper was carried out by quenching and tempering, it is desirable to use it, carrying out RF selective quenching only of the inner skin, and hardening it.

[0006]

[Function] When the material external surface of the support ring which carried out the shape of a

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circular ring was cut with the gear shaper cutter and a gear shaper cutter rotates one time, the engagement projection of an irregular pitch is formed in the external surface of a material. the external surface which the material which forms a support ring is all quenched, and the inside which makes some one way clutches is held at a high degree of hardness, and supports a file plate -- temper processing -- processing -- possible -- and a file plate -- getting used -- I -- disagreeable -- ** -- it becomes a low degree of hardness.

[0007]

[The mode of implementation of invention] Hereafter, one gestalt of operation of the invention in this application is explained. Among drawing 1 and drawing 2, ten are the important section of the automatic transmission for automobiles, and are equipped with the epicyclic gear drive (not shown) using the support ring 11 of the file plate concerning this invention. An automatic transmission 10 has the output gearing 13 supported pivotable on the input shaft 12 as everyone knows. Outer 14a of a roller bearing 14 is supported by the output gearing's 13 boss section, and the friction brake 20 of the multi-plate type connected with the planet gear which is not illustrated while making some one way clutches 15 on the outer 14a is supported.

[0008] An one way clutch 15 is the so-called sprag clutch which is prepared between said support rings 11 which act as an inner ring of spiral wound gasket 16 and an outer ring of spiral wound gasket, and has the sprag 19 held by the retainer 18. Said outer ring of spiral wound gasket 11 is supporting the rotation side file plate 21 of friction brake 20 again.

[0009] The rotation side file plate 21 is pinched by the inhibition side file plate 23 stopped at the change gear case 22 side, is pressed by the oil hydraulic cylinder 24 and controls said rotation side file plate 21. In this way, when the rotation side file plate 21 is controlled by the oil hydraulic cylinder 24, said planet gear which stands in a row in this as usual is locked, and if released, an outer ring of spiral wound gasket 11 will rotate. In addition, there are no automatic transmission 10 and great difference with the above conventionally well-known configuration.

[0010] Said support ring 11 which starts the invention in this application by **** is making the outer ring of spiral wound gasket of said one way clutch 15 while supporting the rotation side file plate 21. As for the quality of the material of the support ring 11, an inside the hard and precise round shape for which it is used by high-carbon steel, quenching and which said sprag 19 contacts Then, nothing, While considering as the martensitic structure which has the hardness before and behind 60 (Hrc60) by the C scale weighting of Rockwell hardness with RF quenching Outside the engagement projection 25 for supporting the rotation side file plate 21 is formed, and this part is changed into the condition of the temper having been carried out before and after Hrc30, and having become sorbite, and has increased shock resistance. Specifically, the quality of the material was successful using S55C. 25a is the pitch circle of the engagement projection 25.

[0011] Two or more engagement projections 25 made to project in the radiation direction from annular body 11a which makes the support ring 11 are arranged by the engagement projection 25 with the irregular pitch, i.e., spacing which is not uniform around the axis of the support ring 11, so that clearly from drawing 1.

[0012] Each engagement projection 25 has the top face 27 which made it the shape of comparatively flat radii which carries out an abbreviation rectangular cross while having the press sides 26 and 26 in it and parallel on both sides of a center line C at both sides, as drawing 5 shows. In addition, a center line C is a line which connects the axial center of the support ring 11, and the axis of the cutter 30 mentioned later. 28 is angular surface picking prepared in order to make easy installation of the rotation side file plate 21. The flat notch sides 29 and 29 which cut in the direction which intersects perpendicularly with a center line C, and were made by lacking in it are established in the part connected with the root of the engagement projection 25 at the peripheral face of said body 11a, and interference with the rotation side file plate 21 is prevented.

[0013] Next, the cutter 30 for gear cutting which is beginning to delete this engagement projection 25 and is made is explained. A cutter 30 is the so-called gear shaper cutter of the gearing form which had tooth form 32 in the peripheral face as drawing 3 and drawing 4 showed, and the mounting hole 31 for

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attaching in the shaft of the gear cutting machine which is not illustrated to a core is formed. In this embodiment, said pitch circle 25a and pitch circle 32a of a cutter 30 are formed in the diameter of said. 33 is a slit for baffles, is prepared in the rear face of a cutter 30, and is engaged to the spindle of a gear cutting machine.

[0014] The irregularity by tooth form 32 and the unevenness by the engagement projection 25 formed in the peripheral face of said support ring 11 are formed in the so-called reverse form where receipts and payments became reverse when the support ring 11 and a cutter 30 roll mutually on said pitch circle 25a and 32a, as drawing 5 shows.

[0015] The tooth form 32 formed in said reverse form has the engagement projection 25 and the corresponding hollow 34. By being located in the base 35 and both ends of the shape of radii corresponding to said top face 27, the corner 36 corresponding to said angular surface picking 28 is formed, and a hollow 34 has further the side attachment wall 37 which consists of a press side 26 and a corresponding involute curve so that clearly from drawing 5. The projected part 38 of the flat triangle extended from the edge of a hollow 34 to the side forms said notch sides 29 and 29. It has contributed that that it becomes possible to use the tooth form 32 of such a complicated configuration made the pitch circles 25a and 32a of the support ring 11 and a cutter 30 the diameter of said.

[0016] as mentioned above, this operative condition -- the cutter 30 which starts like -- the pitch circle of the support ring 11 and the diameter of said -- with -- **** -- since it is made, if a material with pitch circle 25a of ***** is attached and processed using a gear cutting machine -- that peripheral face -- on the way -- unevenness contrary to the irregularity of the tooth form 32 formed in the periphery of a cutter 30 begins to be deleted, without needing the actuation which comes out, and detaches and attaches a material. At this time, since the projected part 38 by the side of a cutter 30 is low as compared with width of face, the roll off formed in the support ring 11 serves as the superficial notch side 29, and there are little damage and wear of a cutter 30.

[0017]

[Effect of the Invention] According to invention of claim 1, cutting of the periphery edge of the support ring which carried out the complicated configuration can be correctly carried out by making into ***** the pitch circle of a support ring and the pitch circle of a cutter which should be processed. According to invention of claim 2, by carrying out a temper, cutting also of the support ring which has a hard clutch side in an inside becomes possible, and a peripheral face can carry out cutting of the periphery edge of the support ring which carried out the complicated configuration correctly. There is which effectiveness.

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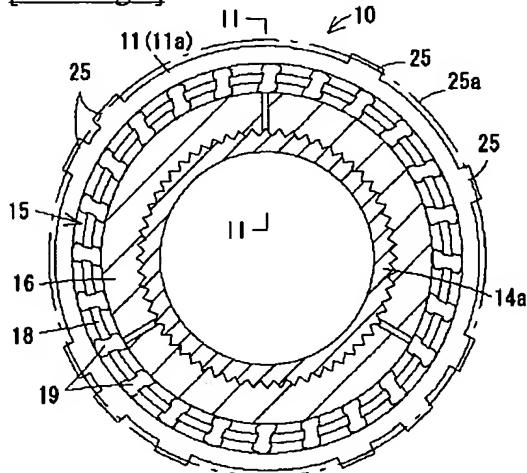
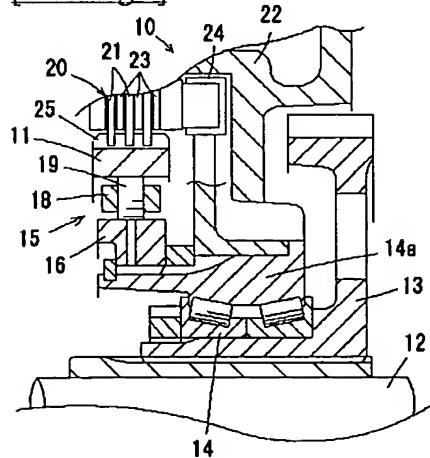
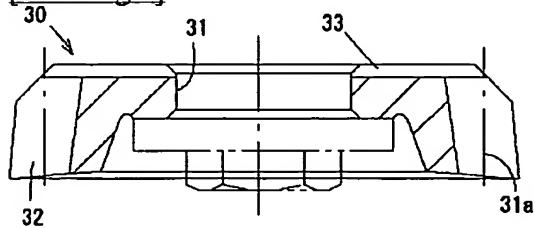
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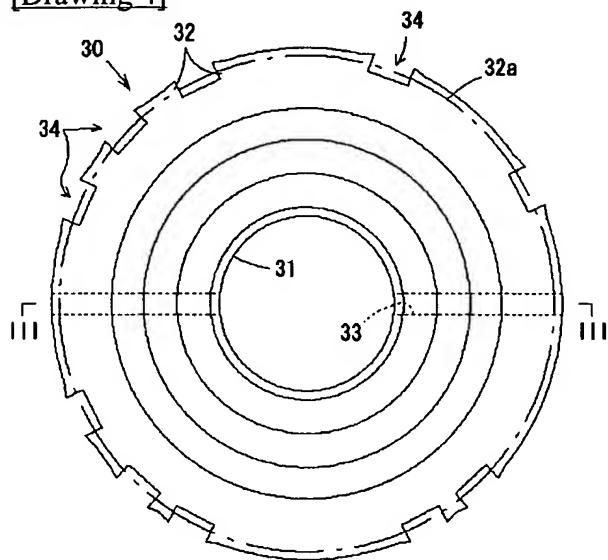
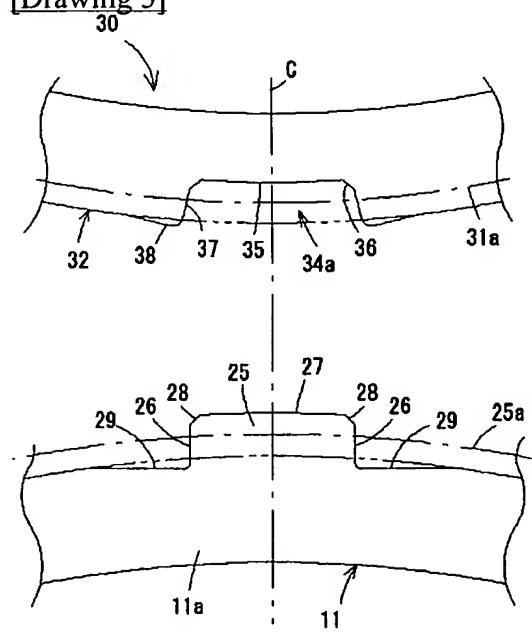
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DRAWINGS

[Drawing 1]**[Drawing 2]****[Drawing 3]**

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[Drawing 4][Drawing 5]

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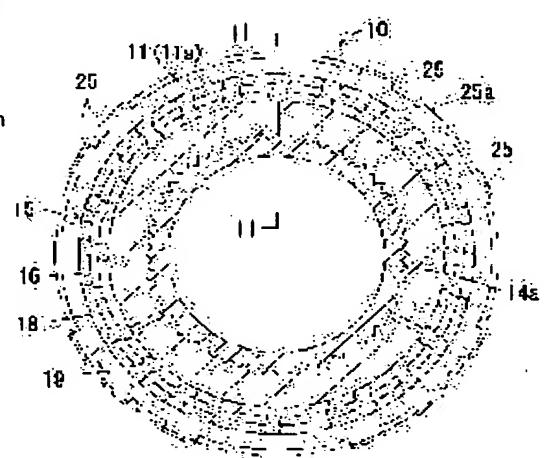
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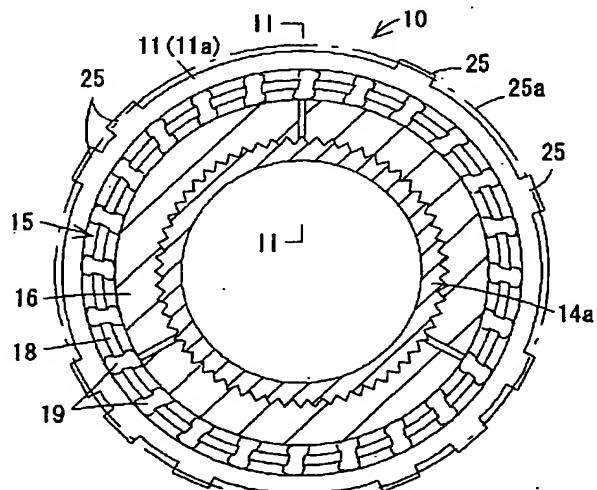
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(54)【発明の名称】自動変速機用摩擦板支持環の製造方法

(57)【要約】

【課題】自動変速機の一方向クラッチを構成する摩擦板の支持環は、内面に一方向クラッチのための硬質な内面をもつ一方で、外周面に摩擦板を軸方向可動に係止する係合突起を有するが、この係合突起の構造が複雑であること、支持環自体が熱処理によって硬化させた後に加工するものであるため、製造が容易でなかった。

【解決手段】円環状の素材を準備し、その素材の外面を外面に設けられるべき係合突起のピッチ円と同径のピッチ円を有し、そのピッチ円上に、支持環へ設けられるべき軸方向の係合突起と対応する逆形の凹凸を形成したビニオンカッタによって歯切りして形成することにより、上記課題が解決される。



【特許請求の範囲】

【請求項1】円環状の素材を準備し、その素材の外面を外面に設けられるべき係合突起のピッチ円と同径のピッチ円を有し、そのピッチ円上に、支持環へ設けられるべき軸方向の係合突起と対応する逆形の凹凸を形成したビニオンカッタによって歯切りして形成する自動変速機用摩擦板支持環の製造方法。

【請求項2】請求項1において、円環状をした前記支持環の素材として、焼き入れ、焼き戻しによって調質されたものの内周面のみ高周波部分焼入れして硬化して使用する自動変速機用摩擦板支持環の製造方法。
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【発明の詳細な説明】

【0001】

【産業上の利用分野】この発明は自動車用自動変速機の摩擦板を保持するため、外周縁に係合突起を設けた支持環に関するもので、特に、前記係合突起を周方向に不等ピッチで設けたものを製造するための製造方法に関するものである。

【0002】

【従来の技術】一般に、自動車用の自動変速機では、外周縁に摩擦板を保持するための係合突起を設け、前記係合突起が外周縁に周方向へ等ピッチで配置された支持環が慣用されている。

【0003】この支持環を製造するには、係合突起をビニオンカッタによって歯切りして製作することもできるが、大径のカッタと大型の歯切り盤を必要とするので、従来は平フライス盤やプローチ盤により、環状をした素材の外周面を軸方向に沿って不用部を削除する加工法が一般的になっている。すなわち、平フライス盤やプローチ盤によって隣接して形成される係合突起の間をミリングカッタあるいはプローチを用いて削除し、係合突起を削り出している。

【0004】

【発明が解決しようとする課題】しかしながら、近年、支持環の外周面に形成される係合突起を不等ピッチに配置したものを従来の切削方法によって製造しようとすると、異なる幅を持つ数種のミリングカッタあるいはプローチを取り付けた数台の工作機械を準備する必要があった。そのため、工作機械の多数を準備する必要が生じる他、ワークを着脱するための工程が増して加工時間が長くなり、加工コストを著しく高騰させる不具合があつた。
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【0005】

【課題を解決するための手段】上記した課題は、円環状の素材を準備し、その素材の外面を外面に設けられるべき係合突起のピッチ円と同径のピッチ円を有し、そのピッチ円上に、支持環へ設けられるべき軸方向の係合突起と対応する逆形の凹凸を形成したビニオンカッタによって歯切りして形成することで解決される。そこでは、円環状をした前記支持環の素材として、焼き入れ、焼き戻
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しによって調質されたものの内周面のみ高周波部分焼入れして硬化して使用するのが好ましい。

【0006】

【作用】円環状をした支持環の素材外面をビニオンカッタによって切削すると、ビニオンカッタが1回転したとき、素材の外面に不等ピッチの係合突起が形成される。支持環を形成する素材は全焼き入れされ、一方向クラッチの一部をなす内面は高い硬度に保持され、摩擦板を支持する外面は調質処理によって加工可能で、かつ、摩擦板と馴染み易いや、低い硬度となる。

【0007】

【発明の実施の態様】以下、本願発明の実施の一形態を説明する。図1、図2中、10は自動車用自動変速機の要部であり、この発明に係る摩擦板の支持環11を利用する遊星歯車装置(図示していない)を備えている。自動変速機10は周知のように入力軸12上へ回転可能に支持された出力歯車13を有する。出力歯車13のボス部にはローラベアリング14のアウタ14aが支持され、そのアウタ14a上に、一方向クラッチ15の一部をなすとともに図示していない遊星ギヤに連結される多板式の摩擦ブレーキ20とが支持されている。

【0008】一方向クラッチ15は内輪16と外輪として作用する前記支持環11との間に設けられ、リテナ18によって保持されたスプラグ19を有する、いわゆるスプラグクラッチである。前記外輪11は、また、摩擦ブレーキ20の回転側摩擦板21を支持している。

【0009】回転側摩擦板21は変速機ケース22側に係止された制止側摩擦板23によって挟持されており、油圧シリンダ24によって押圧され前記回転側摩擦板21を制止する。かくて、油圧シリンダ24によって回転側摩擦板21が制止されると、従来と同様に、これに連なる前記遊星ギヤがロックされ、解放されると外輪11が回転する。なお、以上の構成は従来公知の自動変速機10と大差はない。

【0010】ここで、本願発明に係る前記支持環11は、回転側摩擦板21を支持するとともに、前記一方向クラッチ15の外輪をなしている。そこで、支持環11の材質は高炭素鋼が焼き入れして使用され、内面が前記スプラグ19の当接する硬くて精密な円形をなし、高周波焼き入れによってロックウェル硬度のCスケールで60(Hrc60)前後の硬さをもつマルテンサイト組織とされる一方で、外面には回転側摩擦板21を支持するための係合突起25が形成されており、この部分はHrc30前後に調質されてソルバイト組織となった状態にして耐衝撃性を増してある。具体的には材質はS55Cを用いて成功している。25aは係合突起25のピッチ円である。

【0011】係合突起25は図1から明らかなように、支持環11をなす環状の本体11aから放射方向へ突出させた複数個の係合突起25が、不等ピッチ、すなわち

支持環11の軸線の周りに均一でない間隔で配置されている。

【0012】各係合突起25は図5で示すように、中心線Cを挟んでそれと平行に両側に押圧面26、26を有するとともに、それに略直交する比較的平坦な円弧状とした頂面27を有する。なお、中心線Cは支持環11の軸心と後述するカッタ30の軸線を結ぶ線である。28は回転側摩擦板21の取り付け作業を容易にするべく設けられた角面取りである。前記本体11aの外周面には係合突起25の根部と連なる部分に中心線Cと直交する方向に切り欠いて作られた平坦な切れき面29、29が設けられており、回転側摩擦板21との干渉を防いでいる。

【0013】次に、この係合突起25を削り出して作る歯切り用のカッタ30について説明する。カッタ30は図3、図4で示すように、外周面に歯形32を持った歯車形の、いわゆるピニオンカッタであり、中心部に図示していない歯切り盤の軸へ取り付けるための取付孔31が設けられている。この実施態様では、前記ピッチ円25aとカッタ30のピッチ円32aが同径に形成されている。33は回り止め用のスリットであり、カッタ30の裏面に設けられていて、歯切り盤のスピンドルへ係合する。

【0014】歯形32による凹凸と前記支持環11の外周面に形成した係合突起25による凸凹とは、図5で示すように、支持環11とカッタ30とが前記ピッチ円25a、32a上で互いに転動するとき出入りが逆になつた、いわゆる逆形に形成されている。

【0015】前記逆形に形成された歯形32は係合突起25と対応する窪み34を有する。窪み34は図5から明らかのように、前記頂面27に対応する円弧状の底面35と、その両端に位置して前記角面取り28に対応する角部36とが設けられ、さらに、押圧面26と対応するインボリュート曲線からなる側壁37を有する。窪み34の縁から側方へ伸びる平たい三角形の突部38は前記切れき面29、29を形成する。このような複雑な形状の歯形32を用いることが可能になるのは、支持環11とカッタ30のピッチ円25a、32aを同径にしたことが寄与している。

【0016】以上のように、この実施態様に係るカッタ30は支持環11と同径のピッチ円を以って作られているので、歯切り盤を用いて、略同径のピッチ円25aをもつ素材を取り付けて加工すれば、その外周面には、途中で素材を着脱する操作を必要とすることなく、カッタ30の外周に形成された歯形32の凹凸と逆の凸凹が削り出される。このとき、カッタ30側の突部38が幅に比して低いで支持環11に形成された逃げ部が平面的な切れき面29となり、カッタ30の損傷や磨耗が少ない。

【0017】

【発明の効果】請求項1の発明によれば、加工されるべき支持環のピッチ円とカッタのピッチ円とを略同径にすることにより、複雑な形状をした支持環の外周縁を正確に切削加工できる。請求項2の発明によれば、内面に硬質のクラッチ面を持つ支持環も外周面は調質されたままであることにより切削加工が可能となり、複雑な形状をした支持環の外周縁を正確に切削加工できる。などの効果がある。

【図面の簡単な説明】

10 【図1】本願発明を利用した自動変速機を示す断面図である。

【図2】図1中のⅠ-Ⅰ断面図である。

【図3】歯切りカッタの断面図(図4中のⅣ-Ⅳ断面図)である。

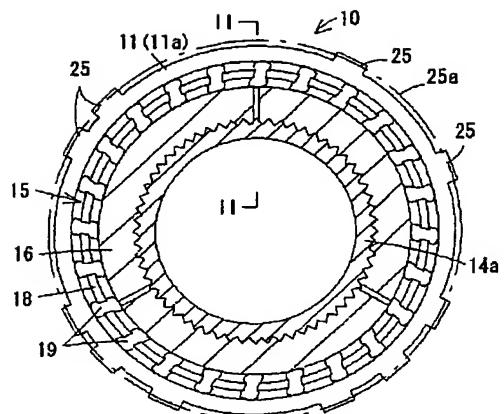
【図4】その底面図である。

【図5】支持環とカッタとの歯型を対比した歯形の正面図である。

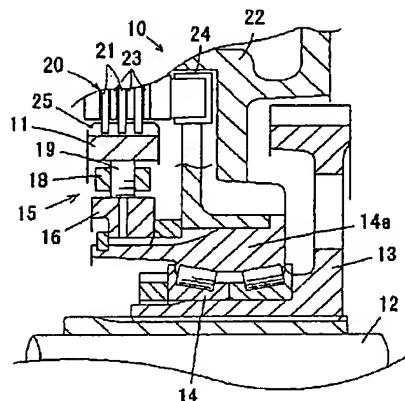
【符号の説明】

- | | | |
|----|---------------------|----------|
| 10 | 11 | 自動変速機 |
| 20 | 11 1 | 支持環、(外輪) |
| | 11 a | 環状の本体 |
| | 12 | 入力軸 |
| | 13 | 出力歯車 |
| | 14 | ローラベアリング |
| | 14 a | アウタレース |
| | 15 | 一方向クラッチ |
| | 16 | 内輪 |
| | 18 | リテーナ |
| | 19 | スプラグ |
| 30 | 20 | 摩擦ブレーキ |
| | 21 | 回転側摩擦板 |
| | 22 | 変速機ケース |
| | 23 | 制止側摩擦板 |
| | 24 | 油圧シリンダ |
| | 25 | 係合突起 |
| | 25 a、32 a | ピッチ円 |
| | 26 | 押圧面 |
| | 27 | 頂面 |
| | 28 | 角面取り |
| 40 | 29 | 切れき面 |
| | 30 | カッタ |
| | 31 | 取付孔 |
| | 32 | 歯形 |
| | 33 | スリット |
| | 34 | 窪み |
| | 35 | 底面 |
| | 36 | 角部 |
| | 37 | 側壁 |
| | 38 | 突部 |
| 50 | C | 中心線 |

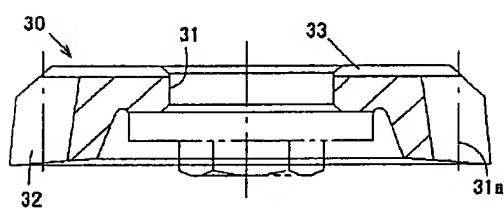
【図1】



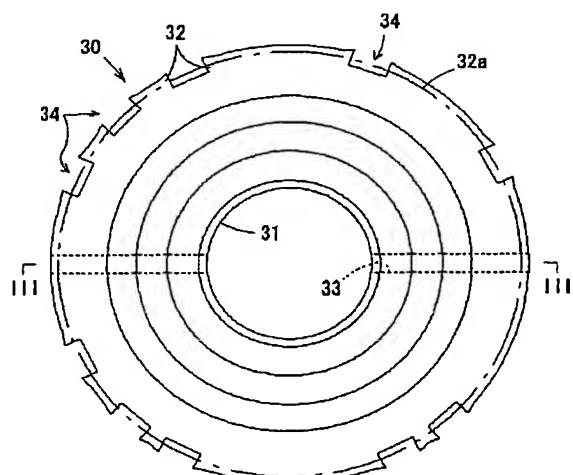
【図2】



【図3】



【図4】



【図5】

